# The effect of a peptide-modified thermo-reversible methylcellulose on wound healing and LV function in a chronic myocardial infarction rodent model.

**Journal:** Biomaterials

**Publication Year:** 2013

**Authors:** Shirley S Mihardja, Jose A Gonzales, Dongwei Gao, Richard E Sievers, Qizhi Fang, Carol A Stillson, Jiashing Yu, Michelle Peng, Randall J Lee

**PubMed link:** 23895998

**Funding Grants:** Embryonic Stem Cell-Derived Therapies Targeting Cardiac Ischemic Disease

**Public Summary:**
Myocardial infarction is the main contributor to heart failure. In this study we examined whether modification of a thermo-reversible cellulose-based polymer with extracellular-matrix derived functional groups could promote wound healing and improve cardiac function in a chronic rodent model of ischemic cardiomyopathy. To beneficially influence the microenvironment of the injured myocardium, we conjugated either the RGD peptide or the HepIII peptide to the polymer. In vitro cell adhesion studies showed that the peptide-modified polymer promoted cell attachment to the polymer surface. Injection of the thermo-reversible polymer into the aneurismal infarct region of the left ventricle showed that the peptide-modified polymer exhibited significantly improved left ventricular function, increased angiogenesis, decreased infarct size, and an increase in cardiomyocytes within the infarct region at 5 weeks post-treatment ($P < 0.05$). The results of this study demonstrate that a peptide-modified thermo-reversible polymer has the capability to alter left ventricular (LV) geometry, increase LV function, and promote myocardial regeneration in a chronic model of ischemic cardiomyopathy.

**Scientific Abstract:**
Myocardial infarction is the main contributor to heart failure. In this study we examined whether modification of a thermo-reversible cellulose-based polymer with extracellular-matrix derived functional groups could promote wound healing and improve cardiac function in a chronic rodent model of ischemic cardiomyopathy. To beneficially influence the microenvironment of the injured myocardium, we conjugated either the RGD peptide or the HepIII peptide to the polymer. In vitro cell adhesion studies showed that the peptide-modified polymer promoted cell attachment to the polymer surface. Injection of the thermo-reversible polymer into the aneurismal infarct region of the left ventricle showed that the peptide-modified polymer exhibited significantly improved left ventricular function, increased angiogenesis, decreased infarct size, and an increase in cardiomyocytes within the infarct region at 5 weeks post-treatment ($P < 0.05$). The results of this study demonstrate that a peptide-modified thermo-reversible polymer has the capability to alter left ventricular (LV) geometry, increase LV function, and promote myocardial regeneration in a chronic model of ischemic cardiomyopathy.